LECTURE: 5

ETD 801S: Science, Technology & The Development Process

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Presentation Outline

- Lessons from the Silicon Valley, California, US
- The situation in Ghana
- Key Areas for policy Actions

Silicon Valley (California/USA)

- Lalkaka (1998) attributes the success of the silicon valley, California to a “culture of risk taking, competitiveness and the freedom to fail, a critical mass of professional services from lawyers and accountants, the existence of technical infrastructure, venture capital and research universities.
- In particular, historical role played by Fredrick Terman of Stanford University in providing opportunities to his graduate students to start business based on their findings is well documented.

Silicon Valley (California/USA) cont'

- One very important aspect of the Silicon Valley is the unique role played by venture capitalists in funding start ups and supporting overall business growth in the valley.
- Kenny (2000) noted the ability of the valley's venture capitalist to adapt to new conditions despite encountering numerous failures.
- Technological and entrepreneurial growth in the Silicon Valley have benefited from the supply of skilled migrant workers most of whom came from China and India.

Silicon Valley (California/USA) cont'

- Whiles the majority of these worker are "knowledge worker" who form the bulwark of the valley's technology-base companied, many of them have risen to become CEOs and shareholders of Silicon Valley's companies.

- Though innovation and new technologies were important ingredients, many have argued that it is the dynamism and the entrepreneurial spirit of the companies located there that drove the valley to new height.

Silicon Valley (California/USA) cont'

- The way business is conducted in terms of risk taking, the willingness to accept failures as well as the ability to network and collaborate with other actors in the regional system are amongst the most important factors accounting for the emergence of the silicon valley as "the high-tech Mecca" of the world.

- The success of the Silicon Valley in California was not a top-down planning initiative by the government.

Silicon Valley (California/USA) cont'

- The government has played a crucially supportive role in the early phase of the valley's development through inter-alia, the award of the R&D contract to silicon valley companies, that notwithstanding, the silicon valley was an essentially market rather than state-driven and it emerged mainly as a product of processes associated with a private enterprise culture.
- The significance of innovation in creating technological breakthrough resulting in old industries, making way for new industries emerging is apparent in the experience of the Silicon Valley.

Silicon Valley (California/USA) cont'

- The silicon valley evolved through 4 major technological phase: **defence, integrated circuit, computer and the internet.**
- The success of the Silicon Valley in the creation of new firms, jobs and wealth and its ability to achieve global supremacy in internet, ICT and other emerging technologies led to the development of global high –tech phenomenon called "Siliconia".
- This phenomenon first spread to other parts of the US before making it way to Europe, the Middle East and Asia pacific regions.

Silicon Valley (California/USA) cont'

- The successful evolution of Silicon Fee is traced to the setting up of the Cambridge science park in 1970 by the University of Cambridge.
- Policy makers in Asia like the counterpart in Europe have looked towards the Silicon Valley model to promote high-tech development in their respective countries.
- In all these regions S&T parks, including incubators, play a pivotal role in promoting and nurturing high-tech companies especially small and medium enterprises (SMEs).

Lessons/factors affecting Silicon-Valley-type strategy

- **Locational factors:** *High-tech clusters are likely to flourish in regions where the enterprise culture is well develop and where educational (university), transport, communication and other infrastructure support services are well provided.* The implication of this is that, a certain level of technological and economic development has to be achieved before the Silicon Valley experience can be invoked in the development of the strategies for transition to a knowledge-based economy.

Lessons/factors affecting Silicon-Valley-type strategy

- **Factors relating to networking and capacity building:** The clustering of firms in specific locations enhances networking possibilities were knowledge-sharing between firms through face-to-face communication. This in turn can help promote innovation. Networking however, presupposes that, physical and institutional infrastructures are provided through the process of capacity building. Short of this, structural bottlenecks would arise, resulting in networking gaps, impairing the development of innovation. Network gaps are common in many developing countries where the process of capacity development is as its infancy.

Lessons/factors affecting Silicon-Valley-type strategy

- **Enhancing access to venture capital:** venture capital is crucial for funding innovation activities and for financing start-up. The source of venture capital would need to shift from central and local government (if this situation prevails) to local and foreign venture capitalists, lest continued provision of venture capital by public agency locks them in vicious circle of budget deficit and economic instability.

Lessons/factors affecting Silicon-Valley-type strategy

- **The role of Multinational Corporations (MNCs):** MNCs play an important role in the development of high-tech clusters. Their important derives not from their domination of the cluster but in their contribution to the development of start-ups business and SMEs. It is important that some form of interaction is established between MNCs and local firms e.g. so that local business evolve along the supply chain learning from the experience, management know-how and technologies of MNCs.

Lessons/factors affecting Silicon-Valley-type strategy

- **Coping with growing pressures of globalization:** would require countries to achieve competitiveness through technological progress. *For this purpose, government would need among others to adopt policies to attract foreign venture capital and to facilitate employment of foreign skilled workers.* Another aspect of the pressure of globalization on individual countries relates to their environmental responsibility. This has implication for the sustainability of the global economy and environment.

The technology development sequence

- From the economic history of Japan and Korea, we deduce *the technology development sequence to be as follows: operation, maintenance, repair, imitation, modification, design, and domestic manufacturing involving innovation.*
- It should also involve the development of local skills and a selective approach that enable local craftsmen to master the adopted techniques.
- The introduction of a new technology must match the stages of industrialization and it must be related to available natural resources.

The situation in Ghana

- What do you know about Ghana's technological development?

Open discussion

The situation in Ghana cont'

- However, it is important to note that a *large mass of ingenuity is known to reside within Ghana's informal industrial sector,* as documented in Smillie (1991) and other publications on the experience of the Intermediate Technology Transfer Units (ITTUs).
- Brew-Hammond (1995) also documents the *largely successful case of technological accumulation in Ghana's electric power generation utility* which is in the formal sector. ***These experiences suggest that some of the necessary ingredients for technological dynamism in Ghanaian enterprises may already be in place and what is needed is locate them and build on them.***

The situation in Ghana cont'

What, then, should be the objectives of innovation in national development?

The objectives of applying science and technology are to:

- lay a solid foundation for the continuous development of S&T through
  - investment in basic infrastructure
  - Acquisition and/or improvement of operational, adaptive and innovative capabilities;
  - Technical training programmes in schools and in companies;
  - The setting up of R&D for each group of similar enterprises.
- Reduce technological dependence through
  - Cutting down significantly on technology and goods imports;

The situation in Ghana cont'

- Doing away with foreign managers and supervisors of enterprises in which the state has interest;
- Ensuring local repair and maintenance of all equipment and machinery;
- Ensuring significant local inputs and materials in assembly and packaging firms.

- <u>Nurture small and medium-sized enterprises through:</u>
  - technology incubators, export processing zones and production networks;
  - Creating links between knowledge generation and SME development, especially engineering, technology and SME development;
  - Creating a network of incentives and support systems,

Recommendations (Policies for promoting industry)

Intervene to promote the build-up of a scientific culture, relevant R&D expertise, and technological capacity for local industry, and technological capabilities in the working population. The interventions can take the form of:

- Improving education, especially engineering and technical education at all levels.
- Lowering the cost and the risk element of doing business by providing social and economic overhead capital, and creating an enabling environment which makes it profitable to assimilate imported technology, adapt it and begin to generate domestic technology.

Recommendations (Policies for promoting industry)

- Encouraging the type of technology imports which allow the acquisition of increasingly complex skills from assembly or the finishing of products to more complex capabilities involving the adaptation, improvement, design and development;
- Putting in place mechanisms and incentives which promote R&D by local firms and technological upgrading by the small and medium sized firms;
- Raising the local content of production to stimulate local linkages and technology diffusion, and for encouraging firms that have been developed in the context of import-substitution activities to engage in exports

Recommendations (Policies for promoting industry)

- Fostering enterprise development by strengthening research and development, have in place entrepreneurial promotion schemes, help to secure venture capital funds, provide training facilities in manufacturing technologies, among others;
- Speeding up literacy campaign in order to create a scientific, or at worst, a functionally literate community. This will aid in the diffusion of growth impulses coming from the top-down approach;

SYNERGY TIME

- Any problem should be brought forward for discussion.
- Suggestions are welcome
- Wise saying & inspirational words

LETS ENJOY OUR STAY